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A PHOTOSENSITIVE ADHESIVE WITH HIGH REFRACTIVE INDEX

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[*There are no amendments to this patent.*]

Specification

1. Title of the invention

A photosensitive adhesive with high refractive index

2. Claim of the invention

1. A photosensitive adhesive with high refractive index comprising a radical polymeric compound containing at least 70 wt% of an adduct reaction product of a brominated cresol monoglycidyl ether and/or a brominated phenol monoglycidyl ether having at least two bromines in the molecule and a catalyst capable of forming a radical upon irradiation.

3. Detailed description of the invention

The present invention pertains to an adhesive capable of adhesion upon irradiation and producing a cured adhesive layer with a high refractive index.

In recent years, photosensitive adhesives are gaining attention as single component adhesive compositions capable of rapid curing at room temperature, and many different resin compositions have been proposed. Photosensitive adhesives are widely used in the construction, automotive, optical devices, lighting equipment, electronic components, handcrafts, etc. where adhesion is required for glass and transparent plastics and other objects. In particular, an adhesive that exhibits adhesion upon application of light and is capable of forming a transparent adhesive layer with a high refractive index is in high demand in the fields of optical devices and electronic components where high precision and reduced size are required.

As a result of much researches conducted by the present inventors on development of a photosensitive adhesive having a refractive index of at least 1.60, they discovered a method whereby a radical polymeric compound with a low molecular weight derived upon performing an adduct reaction for a brominated cresol monoglycidyl ether and/or a brominated phenol monoglycidyl ether having at least two bromines in the molecule and an α,β-unsaturated carboxylic acid was very effective, and the present invention was accomplished.

The present invention pertains to a photosensitive adhesive with high refractive index comprising a radical polymeric compound containing at least 70 wt% of an adduct reaction product of a brominated cresol monoglycidyl ether and/or a brominated phenol monoglycidyl ether having at least two bromines in the molecule and a catalyst capable of forming a radical upon irradiation.

For the brominated cresol monoglycidyl ether having at least two bromines in the molecule used in the present invention, 2,4-dibromcresol monoglycidyl ether and 2,3,4,5-tetrabromcresol monoglycidyl ether can be mentioned, and for brominated phenol monoglycidyl ether, 2,4-dibromophenol monoglycidyl ether, 2,4,6-tribromophenol monoglycidyl ether, 2,3,4,5,6-pentabromophenol diglycidyl ether can be mentioned. For specific examples of α,β-unsaturated carboxylic acid used upon performing an adduct reaction with the above-mentioned brominated monoglycidyl ethers, acrylic acid, methacrylic acid, itaconic acid, maleic acid, fumaric acid and anhydrous dicarboxylate of (meth)acrylate containing a hydroxyl group, etc. can be mentioned.

The adduct reaction of a brominated cresol monoglycidyl ether and/or a brominated phenol monoglycidyl ether having at least two bromines in the molecule and an α,β-unsaturated carboxylic acid can be achieved when a reaction is performed for 1.0 moles of brominated cresol monoglycidyl ether and 0.8~1.2 moles of α,β-unsaturated carboxylic anhydride in the presence of a tertiary amine at a temperature of 80EC or above so as to achieve a reactivity of at least 90%.

For the catalyst used for curing of the above-mentioned radical polymeric compound upon irradiation, a compound capable of forming a radical by light, for example, benzoin, benzoin methyl ether, benzoin ethyl ether, benzoin isopropyl ether, benzophenone, etc. can be used.

It is possible to adequately produce a transparent adhesive layer having a high refractive index when two components of the above-mentioned radical polymeric bromide compound and a

catalyst capable of forming a radical upon application of light is used, but in order to further increase the sensitivity to light, other radical polymeric monomer compounds, for example, oligoester (meth)acrylates, oligoether (meth)urethane (meth)acrylates, epoxy (meth)acrylates, etc. can be included. In which case, it is necessary to include at least 70 parts by weight of the radical polymeric bromide compound of the present invention, and when the mixing ratio of the above-mentioned other radical polymeric monomer compounds exceeds 30 wt%, the refractive index is reduced and adhesion with inorganic glass is reduced as well.

Furthermore, an appropriate amount of thermoplastic resins, extenders, dyes and thixotropy enhancers, etc. can be included.

In the following, the present invention is explained in further detail with application examples.

In this case, the term "parts" in application examples represents parts by weight unless otherwise specified.

Application Example 1

160 parts of 2,4-dibromophenol monoglycidyl ether (epoxy equivalence 332), 36 parts of acrylic acid, 5 parts of dimethyl amino ethyl methacrylate, and 1 part of hydroquinone monomethyl ether were poured into a four-neck flask and an adduct reaction was conducted at a temperature of 100EC for 5 hours so as to produce an adduct reaction product having a viscosity of 5000 cps at 25EC.

Subsequently, 2 parts of a photopolymerization initiator, benzoin isopropyl ether, was dissolved in 100 parts of the above-mentioned adduct reaction product and the adhesive produced was coated onto an inorganic glass sheet with a thickness of 1 mm to form a coating

thickness of 3 g/m^2, the same type of inorganic glass was applied to the surface, and ultraviolet was applied to the adhesive layer for 20 seconds with a 80 W/cm high-pressure mercury lamp.

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The glass-glass laminate produced above exhibited excellent adhesion and destruction of the mother material was observed at a shear strength measured by a Tensilon of 70 Kg/cm^2.

Meanwhile, the above-mentioned adhesive was coated onto a polyethylene terephthalate so as to form a thickness of 20 μ and ultraviolet was applied, and the cured adhesive film produced exhibited high transparency and a refractive index of 1.611.

Application Example 2

Mixing was performed for 100 parts of an adduct of 2,4-dibromcresol monoglycidyl ether and methacrylic acid, 10 parts of oligo ester acrylate produced by condensation reaction of ethylene oxide adduct of bisphenol A and acrylic acid and 2 parts of benzoin ethyl ether so as to produce an adhesive.

The adhesive produced above was used for lamination of an inorganic glass and an acrylic resin sheet and ultraviolet was applied as in Application Example 1 and curing of the adhesive was achieved.

The laminate produced exhibited very high adhesion, and the refractive index of the cured adhesive was a high 1.602.

In this case, production of the above-mentioned adduct material was done as explained below.

An adduct reaction was carried out for 170 parts of 2,4-dibromocresol monoglycidyl ether, 43 parts of methacrylic acid, 3 parts of dimethyl amino ethyl methacrylate, and 1 part of

hydroquinone monomethyl ether at a temperature of 110EC for 3 hours so as to produce an adduct material with a viscosity of 7000 cps.

[*Translator's note: source document ends here*]